

THE MINUTEMAN REPEATER ASSOCIATION

The Minuteman Repeater Association is an organization dedicated to the promotion of amateur radio activities through the use of UHF and VHF Frequency Modulation techniques; to encourage participation in the Radio Amateur Civil Emergency Service (RACES) of the Commonwealth, or any county or town therein, and the U.S. Government; to develop, utilize and coordinate amateur radio repeater systems as licensed by the Federal Communications Commission; to assist Civil Defense and other units of government in the field of communications as the need may arise; to sponsor any endeavor or engage in any other non-profit purposes for and in behalf of the membership of the Association, which is consistent with the provisions of Internal Revenue Code, section 501 (c)(7).

The MMRA owns and operates four two meter repeaters, one 220 repeater and one 450 repeater:

Marlboro	146.01	-	.61
	444.925	-	449.925
(host)	222.34	-	223.94
Stoneham	146.115	-	.715
Quincy	146.07	--	.67
	222.80	-	224.40
Weston	146.22	-	.82

All general correspondence and inquiries regarding membership should be addressed to The Minuteman Repeater Association, P.O. Box 2282, Lexington, MA 02173.

BOARD OF DIRECTORS

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Board meetings are held the fourth Wednesday of the month (except July) at 7:30 PM at 85 Speen St. in Framingham

THE MINUTEMAN

THE MINUTEMAN, the official Newsletter of the Minuteman Repeater Association, is published six times a year. The purpose of the Newsletter is to keep its members informed on meetings, special events and actions of the officers and membership. It is also to serve as a source of technical information written by its members and to list equipment offered for sale. Letters to the Editor are strongly encouraged, and they must be signed. Names will be withheld upon request. Material for The MINUTEMAN should be sent to the Editor, William Shaughnessy, KBIDY 76 Oak Hill Road, Westford, MA 01886

PUBLIC SERVICE NET

Tuesdays - 7:30 PM on 22/82 Traffic or comments

APPOINTMENTS FOR THE YEAR 1984-1985

Trustees of repeaters

-61 Gary Johnson WALQMI (H)881-5787
-67 Joe Devin, Sr. WLMWF (H) 782-8893
-715 Bill Sencabaugh K1UAQ (W) 942-0100
-82 Gerry Horne KLG0I (H)897-3996 or 7146
-220 Tom Holmes WALZID (H) 961-3156
-450 Fred Campbell WBLFAE (H) 485-7939

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Education

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Microprocessor and New Tech Projects

Andy Morrison N1BHI

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Earle Benson WHXF (H) 944-1020

Ombudsman

Gene Piken WBLHAP (H) 359-7686

Raffle

Dottie Hilbrunner N1BHA (H) 326-1143

because we know that any dues may be difficult for many amateurs and an increase may preclude some of us from being members. The difficulty is compounded by the addition of two new repeaters in the past couple of years and having auto patch facilities on five repeaters. The expansion decision required us to weigh our duties to future generations of MMRA members and provide the services which are expected to be provided to keep up with the technology of the new radios which have countless bells and whistles as standard equipment. The frequencies in 450 MHz and 220 MHz will soon be used and non available. This has already happened in areas which enjoy larger HAM populations. The selfish approach was to say, "They already have enough repeaters for the \$20.00 dues so lets make it easy on ourselves." The selfless approach was to think of those coming after us and providing for the future. I, for one, do not believe that HAM radio is dying out and will be replaced by computers. Our adventure in better technology will allow the computerists to have a HAM radio use for their hobby and how many of you get fed up with your compuserv bills?

This year is the most difficult we have faced despite the fact that our equipment is the best that it has ever been and the envy of many smaller organizations. The difficulty has been caused by the fact that dues are now payable in September instead of the anniversary of each member. The former system required the use

of a large mainframe computer to maintain, and even then the secretary's task was so formidable that nobody wanted the job. Our present secretary was up to this task, but even then mistakes were made as the result of the computer input difficulty caused by constant monthly renewals.

The only problem now is the need for prompt renewal. We can plead but we cannot control this - only you can. You can make the difference between profound success or failure by your response to renewals. Your response has been excellent but the treasurer's report will show that many have not yet submitted their dues. I know that many of you have been intending to send in your renewals but have not yet gotten around to it.

Please show us your confidence in our ability to keep these repeaters running and serving you. Let us give you new services such as increased linking coverage and better repeaters. Don't allow us to shut down a repeater for lack of funds. We are you and you are us - we need each other. Each year has produced improvement in equipment and services; please let this year be no exception. Press deadline necessitated great haste in writing this column, and I almost forgot to thank Gary, WALQMI and Bob, W1IBF and any others who helped in the talk-in for the convention.

De, KA1AL

TREASURER'S REPORT

Period: October 1, 1984 to October 25, 1984

EXPENSES		INCOME	
015-715	\$ 26.90	Dues	\$3,862.27
Secretary	59.65		
Meetings	68.64		
Education	46.00		
Total Expenses	\$198.19		

YEAR TO DATE

Period: May 22, 1984 to October 25, 1984

EXPENSES		INCOME	
01-61	\$ 332.79	Dues	\$5,819.46
07-67	503.38	Raffle	128.00
015-715	129.83		
22-82	543.87	Total Income	\$5,947.46
220-Quincy	11.66	Balance brought	
450-Marlboro	143.00	forward 5/21/84	\$2,143.81
Treasurer	8.35	Total Income	5,947.46
Secretary	151.46		8,091.27
Newsletter	261.63	Total Expenses	- 2,493.18
Meetings	350.88		
Education	56.33	Balance as of	
Total Expenses	\$2,493.18	10/25/84	\$5,598.09

KB1DY

EDITOR'S CORNER

It's hard to believe that the holiday season is fast approaching. Most of us are still basking in the late fall sun and high temperatures. Don't be fooled the Montreal Express is on its way!

My request for contributions to the newsletter brought several pieces to my mailbox. For that, I am grateful. It's not easy trying to fill 8-10 pages with interesting material. After all, if we fill the newsletter with news gleaned from other publications rather than news of a local nature we aren't getting the job done.

It was nice to see all the MMRA people at Boxboro. The room that we had was well visited and many new members were enrolled.

The next meeting will be held on November 13, 1984. The site will be new to everyone except me. I will be playing host to the members at my company cafeteria in Lexington. Please see details elsewhere in this newsletter. I hope to see you all on the 13th.

Good holiday wishes to each of you from the staff of the Minuteman and the Officers of the Association.

KB1DY

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NASA headquarters has forwarded to Johnson Space Center the joint AMSAT/ARRL proposal to have astronaut Tony England, WOORE, carry amateur radio equipment with him on his flight scheduled for next April. The proposal has been accepted philosophically by NASA. JSC engineering personnel must now make technical and feasibility assessments. ARRL expects NASA to send a letter to the two organizations in a few weeks informing them of the acceptance contingent upon the project meeting all NASA technical and operational criteria.

It was Dr. Tony England that first announced to the world (at the West-Gulf Comm-Venture two years ago) that Dr. Owen Garriott, W5LFL, would be carrying amateur radio aboard the STS-9. He now is getting a chance to do the same thing himself!

W5YI

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A petition has been filed with the FCC to permit persons failing an amateur operator license examination element to be re-examined on that same element within seven days instead of the present 30-day wait. It is identified as RM-4835, and was received on 07/23/84 from Phil Miller, KB8QX, of Charleston, West Virginia.

WHAT TO DO BEFORE THE POWER FAILS

It has been said that the only thing wrong with New England is February. My most unpopular month is December because we get ice storms which coat the trees and they, in turn, fall over the power lines severing electrical service. We are all heavily dependent on electric power and the weather has a profound effect on this. Flashlights are great when working but they frequently do not. And who can locate spare batteries in the dark. Thus, secondary or rechargeable cells, if kept up to snuff, can be a brilliant alternative. "Gel-cells" are more cost effective than nicads in terms of watts per dollar and lack the memory effect of nicads which can limit their capacity. Most modern ham gear operates on a 12.6 volt d.c. power input, so a d.c. power supply, preferably regulated, has become common place. If this supply is to be used as a battery charger, a blocking diode should be inserted in series to prevent the battery from discharging thru the supply when it is not charging. By keeping your no water added "gel-cell" or sealed motorcycle batteries on trickle charge they will be ready for emergency use without bubbling over to cause acid damage. The high intensity bedside reading lamps are normally provided with 12 volt lamps and a wall transformer. These are readily reworkable to d.c. battery operation. Using the battery system for regular light and ham transceiver operation tends to keep the system ready for both routine and emergency use which is more than can be said for the bedside flashlight. You may choose to add a radio receiver or battery operated TV to the system to prevent boredom while awaiting progress from the utility repair crew.

Providing your own a.c. power to keep warm or cool in emergencies takes a bigger investment than the charging scheme described above. Few heating systems operate without a.c. control voltage, and while you are freezing, your groceries in the refrigerator/freezer thaw, unless drastic action is taken or the power outage is brief. Heating and cooling devices have inductive, low power factor loads such as motors which raise merry hell with most static inverters. Gasoline driven motor generators such as those made by Heath and Honda have some disadvantages. They are noisy and are provided with small fuel tanks which are dangerous to refill when the machines are hot, and may run contra to fire and insurance regulations. There are gas fired MG sets but they are expensive and few households are plumbed for propane. A belt driven, d.c. excited alternator installed in the family car circumvents most of the aforementioned objections. One such device is made by Mindgn Mfg. Co. of Mahan, Miss. and sold under the trade name "Auto-Gen." This does the job at moderate cost for the handy man who provides his own installation. If the major electrical loads are time shared, a one horse power unit should suffice. The heater and freezer will be able to perform satisfactorily if run for two to three hours in each twelve hour period. A heavy duty (#12 AWG) extension cord from the car in the driveway (not the closed garage) is a prudent investment. A power transfer switch and emergency a.c. input should also be installed in advance on the home heater or air conditioner as the case maybe. Having gone this far, you may be tempted to fire up the linear, rotary beam, etc. and do some dxing rather than freezing in the dark.

de W1QJF

HOW TO KNOW WHEN YOU'RE AN OLD-TIMER

You finally reach the top of the DX ladder to find it leaning against the wrong wall.

You sit in a rocking chair at the operating desk and can't get it going.

Young squirts begin to look middle-aged.

The first thing you look at in QST is "Silent keys."

Your favorite part of QST is "50 years and 25 years ago."

You know all the answers on how to work DX, but nobody asks you the questions.

When climbing the tower, your knees buckle more than your safety belt.

You walk with your head held high, trying to get used to your tri-focals.

The little grey-haired lady you help across the street is your wife.

- Hall Godfrey, N6AN
World Radio

RECEIVER FREQUENCY STABILITY

Today we have receivers using Phase Locked Oscillators and other high stability circuits such that we can dial up a number on a numeric readout and receive on that frequency with accuracy and stability. Thus, along with digital techniques, we now can scan a band of frequencies for a signal with crystal accuracy well up into the hundreds of MHz. It was not always so! Let us take a quick look at some of the things that came before.

The first thing that comes to mind is crystal set. This is a form of Direct Conversion. That means that the R. F. signal is demodulated directly into A. F.

For the old "A. M." signals there was no stability problem but there also was no sensitivity or selectivity with the simple receiver. For this we can use one or more tuned R. F. amplifier stages. The tuning of each stage tracked with the dial. For A. M. this worked fine and was called a "Tuned Radio Frequency" (TRF) receiver. For CW and SSB reception on this type of receiver just add a BFO and perhaps use a product detector. This receiver will work just fine but the BFO must be tunable to the same frequency range as the receiver and this can lead to drift of the BFO, (VFO). Now take this receiver and make it multiband. This means a lot of switching for all the RF amplifiers and the BFO. Switching the BFO frequency range means that the drift may vary from band to band, as well as the tuning rate (KHZ per dial revolution).

ENTER THE SUPERHETERODYNE

One of the ways that we can improve on the TRF is the early Superhet. This didn't do much for the stability but did help the sensitivity and selectivity. This receiver takes the RF input signal and converts it up, or down, in frequency into an intermediate frequency - IF. This IF is constant so we can use narrow band IF transformers and even a crystal or mechanical filter for selectivity. All the stages often the 1ST. Mixer (converter) are just like a fixed frequency TRF receiver. Now the BFO can use a crystal for stability (one for USB and one for LSB). Without the good filters there may have been two IF frequencies with a crystal oscillator used with the 2ND mixer. The 1ST IF may have been at 455 KHZ or even up in the MHz range for image rejection and the 2ND IF as low as 50 JHZ for selectivity, using LC circuits. As I said all this did nothing for stability however. In fact the superhet as I have described it this far may be about the same as the TRF in terms of stability due to the UFO used in the 1ST mixer. This UFO has to tune the same frequency range as the RF frequency range we want to receive. It is first offset in frequency by a frequency equal to the 1ST IF frequency. This along with the multiband switching leads us back to the same drift and tuning rate problems we have with the TRF.

ENTER THE LMO

One way around all of this is to use a crystal oscillator with the 1ST mixer, one for each band. The output of the first mixer now feeds a wideband IF. This may be a wideband transformer or it may be a tuned RF amplifier that tracks with the dial, ala TRF. The 2ND mixer will use a VFO for receiver tuning. The same UFO is used on all bands and with only one VFO we can now spend the \$\$ and make it stable and linear. Now the drift (hopefully low) and tuning rate will be the same on all bands. With only one VFO to stabilize and all other oscillators crystal controlled this can lead to a very stable receiver.

There are many other ways used to achieve frequency stability, the trick here was to use the same VFO on all bands and make all other oscillators crystal controlled. The next step is to use only one very high stability crystal oscillator and PHASE LOCK all the other oscillators in the receiver, including the VFO, with this "master oscillator."

All of the above schemes can also be used in the transmitter and with the same frequency relationships used in both this lends itself well to transceiving.

Jim Lisson WA2CEP

From THE CARRIER - MT. DIABLO - ARC

REMINDER - The 60 day grace period for the payment of MMRA dues ends on November 30. Active membership ceases for those whose dues are not paid by this date.

BUY and SELL

FOR SALE - Complete Drake Station. T4XC, R4C - extra crystals and filters; MS4/AC4 speaker and power supply; CW Sendin' Machine memory keyer; L4B with factory 10 meters; complete set of extra tubes (except finals for L4B) plus another almost complete set. Entire station complete - \$1350. Transmitter, receiver, tubes and power supply - \$650. I will not sell the linear separately. Pamela R. Rathmell, K4YX, 287 Sudbury Street, Marlborough, MA 01752. Phone: 485-2116, Eves., 576-4581, days.

WELCOME TO NEW MEMBERS

WLAKD	John	Harvard
WLBK	Charles	Hudson
WALCFX	Howard	Framingham
KALCKU	Peter	Wakefield
NLCYR	Ormsby	Stoneham
NLDDW	Deborah	Concord
WLDE	Edward	Medfield
NLDM	Dominic	Watertown
WBLEAZ	Ronald	Andover, CT
KBLEB	John	Wayland
WLEPW	Dalton	Norwell
KBLFG	Edward	Acton
WIGO	Tom	Lexington
KLGTD	Walter	Millis
KALHFG	Richard	Westboro
WBLHJS	Mark	Marlboro
KALHUK	Abbie	Acton
WALIOB	Leonard	Marlboro
W2IRW	Myles	Framingham
KILS	John	Topsfield
KALJLT	James	Marlboro
KIKOO	Charles	Sudbury
KALKVI	Barry	Stoughton
KALLDV	Paul	Auburndale
KALLNR	Erich	Sudbury
KALLQZ	Kathleen	Wakefield
KALLRC	Brad	Stow
WALMOP	Perry	Lexington
WA2MVP	Harvey	Little Neck, NY
WLPBC	Carl	Milton
WALQMI	Gary	Wayland
WD8RJJ	Mark	Maynard
KALSC	Kevin	Peabody
WALVAV	Bill	Newton
KA6VNY	Jeffrey	Arlington
WB8WGY	Steve	Wayland
WALWIG	Gerald	Bellingham
WB7WOG	Neal	Stoneham
WIZEN	Onie	Marlboro

PACKET RADIO IS TRN SUBJECT

"Packet Radio Overview and Prospective" will be the subject of the December 2nd North American Teleconference Radio Net (TRN). This net, heard on over 150 gateway station (mostly VHF repeaters) across the United States and Canada and on the OSCAR-10 satellite, will explain what packet radio is, describe how to get started in it, point out the benefits to you, and outline the pitfalls to be avoided for both the novice and expert alike. The speakers on this TRN will be none other than Lyle Johnson, WA7GXD, and Harold Price, NK6K.

Local access to TRN is on 147.12.

World Radio

The friends on the Stoneham repeater are planning a holiday get-together at the China Moon, Rte. 28 in Stoneham. All MMRA folks are welcome. The date of the happening is December 10th at 6 o'clock. Hope to see you there.

WIHXF

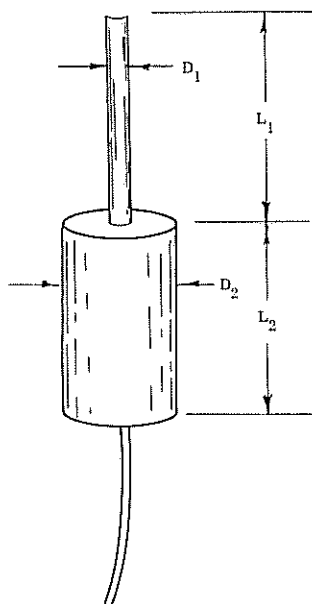
TWO METER FAT DIPOLE

A GOOD, USEFUL ANTENNA

(You too can design antennas. Follow the K1CCL method given herein.)

ROOTS. Quarter wave antennas such as those made by sticking a 19" wire on a piece of test gear, or by putting a rubber duckie on a hand-held T/R — are really quite poor antennas. In order to radiate, the quarter wave element must work against its mirror image. This mirror image can be provided through capacitive coupling to the operator's hand, or to the equipment cabinet and power line. Ideally, the image is provided by a good ground plane consisting of at least 4 19" radials perpendicular to the radiator at its base. (These tend to poke you in the eye during hand-held operation.) Another good way to solve the problem is to actually provide the other half of the antenna — make it a dipole. This has to be fed at the center and the feed line kept reasonably at right angles to the vertical dipole — awkward!

DESIGN CONCEPTS: The Bailey,* or coaxial dipole in which the feed line is run up inside one of the radiating elements offers promise. It may not work well if the jacket is left on the coax and the coax occupies a large portion of the internal space. This is because the coax outer shield of many cables is purposely lossy to conduct away static charges. You may remove the jacket and substitute heat-shrink tape — or make the element large with respect to the coax. The latter has some real advantages.



DESIGN SOLUTION: Figure 1 shows the basic geometry we are going to use. It is easily implemented by making the larger element from coffee or juice cans, and the smaller element of copper pipe. A UHF or BNC connector is installed in the center of the end of the can to accept the small connector. (The antenna disassembles for transportation.) The feed line is connected to the bottom of this connector. A wooden base will hold the assembly upright. The feed line is led out through the base. Such an antenna gives us low (and predictable) VSWR, broad bandwidth, good radiating efficiency and versatility — a rubber duckie can be substituted for the top element, for example. The antenna is useful on the workbench, the desk and in the attic for working the repeaters.

I first saw an antenna like this, when Bill, K1IJZ brought one to a MMRA board meeting. Bill would take the rubber duck off his hand-held unit and plug it into his juice can assembly. He'd then plug the assembly into his rig. You could tell the difference, and he said it was just shy of 10 dB. Now a number like that gets my attention. So I put the problem to old friend Chet Smith, K1CCL.†

What is going on here, I asked him? With characteristic erudition and thoroughness, he provided the design equation, the background information you have been reading and specific design figures for my individual case. According to Chet, C.T. Tai† gives the impedance of a dipole up to a half wavelength as:

$$Z_a = R_a(\beta_0 L) - j \left\{ 120 \left[\ln \left(\frac{4L}{D} \right) - 1 \right] \cot(\beta_0 L) - X(\beta_0 L) \right\}$$

The design strategy is to reduce the term inside the brackets to zero for each element. This is done by selecting the length/diameter ratio in each case. This leaves only resistive terms which can be combined directly. When I complained about the chore of the mathematics, Dr. Smith went all out and provided the nifty nomogram presented as Figure 2. Be sure to save this. It is a universal chart. The diametric dimensions are linear enough that any element diameter can be scaled by eyeball in between the values given. Here is how it works.

SAMPLE DESIGN: I had 2# coffee cans for element 2. They are 4.95" in diameter — call it 5". Now referring to Figure 2, I select the 5" line (D2). Follow the 5" Dia line down to where it intersects the "Reactance = 0" curve at point (A2). From there I drop straight down to the abscissa and read 18". This is at (L2). So I cut my tin can element to be 18" long. The line L2, A2 is now projected upward until it intersects the "Resistance" curve at point B2. From this intersection we read the value 54 Ohms at point R2.

In the same way, we determine the length of the 1/2" element to be 19.2" and its resistance as 63.5 Ohms. I plugged this unit in and measured its length from the coffee can end, marked the copper, and separated it with a tubing cutter.

Resistance of the complete antenna is $(54 + 63.5)/2 = 58.75$ Ohms. For a 52 Ohm cable this would be a VSWR of $58.75/52 = 1.13:1$. Mine came out about that way — and it's still below 1.5:1 at 144 MHz. Figure 3 shows the final hardware.

Chester says he'll make up nomograms for 6, 220 and/or 440 if they are needed. Get in touch with him.

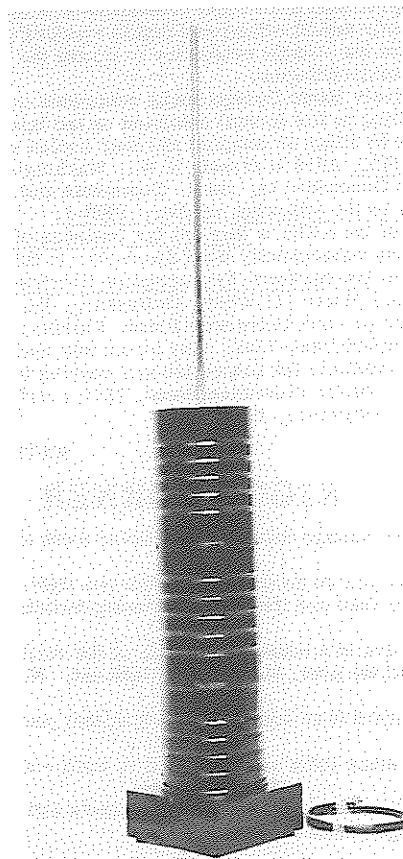


Fig. 3. The author's final version of the fat dipole. The coffee can element is 5" in diameter and 18" long. The tubing element is 3/8" in diameter and is cut such that the end of it is 19.3" above the coffee can end.

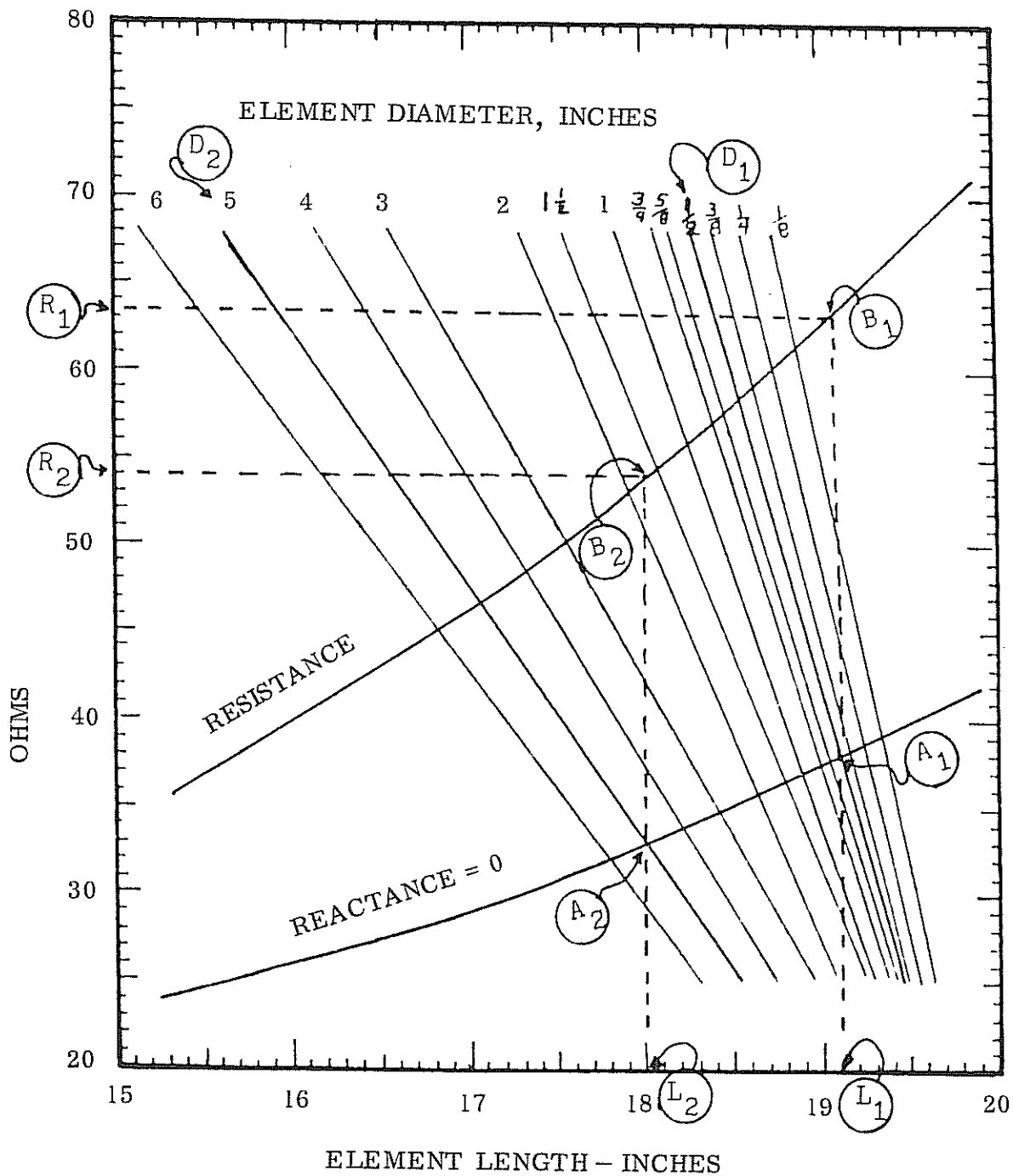


Fig. 2. Nomogram for calculating element length and radiation resistance of asymmetric dipole antennas for two meters ($F = 147.00$ MHz).

* After the late Arnold B. Bailey of Concord, Mass. who invented it many years ago.

† Dr. C. L. Smith, MITRE Corp., Bedford, Mass.

‡ C. T. Tai, "Characteristics of Linear Antenna Elements," Chapter 3 Antenna Engineering Handbook, H. Jasik, Editor, NY, McGraw-Hill, 1961.

de George Downs W1CT

Reprinted from March, 1981 Newsletter



The Minuteman



Volume 13 Number 2

The OFFICIAL NEWSLETTER of the
MINUTEMAN REPEATER ASSOCIATION

November 1984

MEMBERSHIP MEETING

<u>DATE</u>	Tuesday, November 13, 1984
<u>PLACE</u>	W. R. Grace, 55 Hayden Ave., Lexington, in the cafeteria (see map)
<u>TIME</u>	7:30 PM, doors open at 7:00 PM for socializing
<u>SPEAKER</u>	Jim Greenleaf, KD4GG, from the Boston Office of the FBI
<u>RAFFLE</u>	Prizes - 2 meter amplifier and two METZ antennas
<u>REFRESHMENTS</u>	Free coffee and donuts

PRESIDENT'S CORNER

The ARRL Convention in Boxborough is now history and I am pleased that we were able to have a room displaying repeaters and perform frequency and deviation tests to visitors. My profound thanks to Earle Benson, W1HXF, Evelyn Benson, KA1BBN for assistance and making all arrangements to obtain the room; to Bill Wade, K1IJZ for the countless hours spent in greeting the people, setting up a repeater and performing the test functions; to Tom Holmes, WA1Z1D who helped out in the same functions and brought in a 220 MHZ repeater for display. I also thank the MMRA members who gave their time and assistance in our room. This was so successful that we hope to be able to do this again with enough lead time to publicize in the official program and in the Newsletter.

Please try to attend the November membership meeting. This should be a Highlight of the year. This meeting will be at W. R. Grace and hosted by our treasurer, editor, Bill Shaughnessy, KB1DY and details are elsewhere in this newsletter.

Activity in public service has been at an all time high and we thank all the people too numerous to mention for their excellent and devoted service to such events as "The Head of the Charles" boat races.

The Weston repeater group headed by Trustee, Gerry Horne, K1GOI and Tech Chief, Bill Wade K1IJZ, assisted by Chris, (Gerry's son) KA1XK, Andy, N1BH1 myself, Father Dan W1HWK (who helped us gain entrance) and last but not least Dick Whitten, WB1CTO recently worked on the antenna at Weston which had been knocked out of alignment in our last snow storm. Dick's professional quality knowledge and dexterity made this difficult job appear easy. The antenna was aligned and the radials brought up in angle, immediately improving the performance of the repeater. The YAGI antenna for the Arlington link was aimed at the site so that we should be ready when the Arlington people complete their new tower installation.

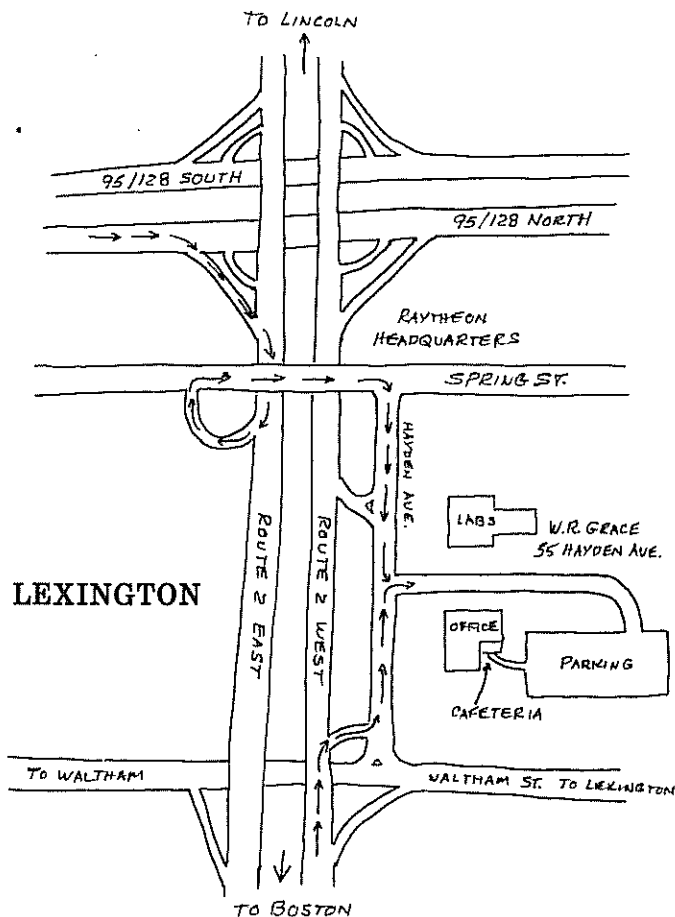
A speedy recovery to MMRA stalwart, Joe Devin, W1MWF, Trustee of the 146.07/67 repeater and former Vice President. It takes a lot to knock Joe down and keep him from his activities with the repeater and the organization which he has served so well over the years.

The MMRA has once again become an American Radio Relay League affiliate and our thanks to Tom, K1KI for his assistance in cutting the red tape. Some of us may feel that this affiliation is not a positive benefit to the MMRA, but in these days of attacks on our frequencies by commercial services, and now that we as amateurs are responsible for education and the administration of exams, the benefits derived from the communications we will now receive, should outweigh any personal feelings as to the politics or administration of the ARRL. The right to attend planning meetings will at least give us the ability to have league officials hear our views; this positive input is better than silent griping.

Any member wishing to represent the MMRA in a liaison capacity with the ARRL, please drop a line to the MMRA or sign in on the activities sheet which will be at the November meeting. Furthermore, if you wish to get involved in activities of the club such as newsletter, public information (PR), repeater maintenance, technical projects or construction, education or anything else that you would like to do please let us know or sign in on the same sheet at the meeting. We will welcome your assistance and there are no politics when it comes to offers of help and service.

The subjects of dues and budgets are not the most enjoyable discussions for me to engage in, but we once again made the decision to keep the same dues structure for the fiscal year,

continued on page 2



1984-85 MEETING DATES

Tuesday	Nov. 13	Lexington
Wednesday	Jan. 16	
Monday	Mar. 18	
Tuesday	May 21	

Telephone 617/486-3400, 3040
 675 Great Rd., (Rte. 119) Littleton, MA 01460
 1 1/2 miles from Rte. 495 (Exit 31) toward Groton, Mass.

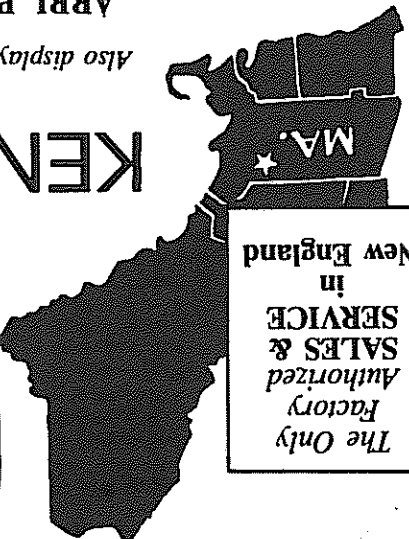
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